APPENDIX C

Technology Solutions to Electronic Transactions

Technological Challenges to Online Commerce

As in the analog world, selling on the Internet extends far beyond the actual transaction between vendor and customer to encompass before- and after-sale ingredients. Inventory management, customer service, site management and marketing analysis tools, to name a few, have been finely honed over decades in the analog world, and they all have their digital corollaries. Creating an online transaction system that combines all of the service components customers have come to expect from their vendors with the efficiencies promised by the digital world requires a set of tools that takes a holistic view of the selling process and comes from years of experience and business implementation.

A technology solution to selling on the Internet needs to address the same issues as in the analog world, only with digital twists, as well as new concerns specific to the Internet. Making that solution seamless to the customer and easily implemented by the vendor is key to successful electronic commerce. Digital River's proprietary Commerce Operating System provides the unseen infrastructure for the sale and download of software from thousands of developers and dealers, allowing them to concentrate on the store and products instead of the administrative and technical aspects of the transaction. The system is also completely transparent to consumers, allowing vendors to control every aspect of its relationship with their customers, even as Digital River provides the functionality behind the transaction.

Digital River enables the sale and download of software from thousands of sites, including a large network of independent dealers. Digital River provides the backbone system that makes e-commerce sales possible from these many distributed points of entry. In building this unique model, Digital River has recognized that availability, security, and auditability are critical, and it has therefore confronted these issues and developed its capabilities on a much greater scale than individual sites or malls have done.

Digital River has responded to these critical issues with a symbiotic combination of systems, software, and administrative processes. These capabilities ensure the continuous availability of the software products for sale and the availability of sales information to clients.

Security

For both vendor and customer, security in an online transaction is paramount. Vendors selling electronically-transmittable items, such as software and music, need to be assured that their products are being paid for, the integrity of their systems are assured and their customers' data

2

are not jeopardized. Consumers continue to rate security as their primary concern when it comes to transactions over the Internet, far surpassing other considerations found in more traditional transactions, including price, selection and customer service.[1]

Digital River's proprietary Central Host Management System uses both firewalls and a proprietary security program to safeguard both a vendor's business information and its products, providing stability and auditing functions. The system also addresses the customer's concerns over credit card and personal information by using Secure Socket Layer, a public and private key encryption technology that protects data between the client and server.

Digital River's proprietary Software Defense Mechanism uses multiple safeguards to restrict access to bona fide buyers. For example, a person's information such as e-mail address, mailing address, and credit card number are matched against a database of known fraud cases. A smart would-be thief might be able to spoof his IP address, but he would find it extremely difficult to counterfeit all the pieces of required identifying information.

The SDM profiling accumulates information and learns about each user as it performs security profiling based on many discrete variables, so the more illegal attempts that are made, the more effectively the security system thwarts them. For example, users have only a few tries to enter their access number correctly before they are instructed to call Customer Service. Similarly, a customer cannot download software more than a preset number of times in a certain period, or buy one copy of a product and then download 500 copies. These built-in protections of the SDM also prevent spammers from shutting down the network with junk e-mail.

The SDM continually takes network "snapshots," matching all traffic against established rules and procedures. The SDM also includes internal safeguards, protecting the software products and the customer databases from unauthorized access from within Digital River.

Besides protecting against hackers and thieves, the SDM offers security for the legitimate customers as well. For example, if a user's transmission is interrupted, or if a customer chooses to do the credit card part of the transaction off-line, an "unlock code" option is presented to the user for reentry. The code matches the previous identification and allows further data exchanges.

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[1] Eighty-nine percent of 2,161 respondents to the Georgia Institute of Technology's Graphic, Visualization, & Usability (GVU) Center's eighth study on Internet usage cited "security" as being "very important," compared to 36 percent who said the same about "lowest price," 58 percent for "variety" and 61 percent for "customer service."

3

Scalability

The scalability of a Web site speaks to the concern that online customers cite as the second-most important aspect of a site: reliability.[2] Just as a real-world business must be equipped to handle fluctuating demand and broad and deep product lines, online businesses must as well. Digital River's solution relies on multiple routines that allow it to maintain thousands of sites and millions of products, balancing systems resources, bandwidth, effective graphic user interface design and maintainability. These tools include, but are not limited to:

- Technical staffing that is stable relative to the number of clients and products.
- Oracle databases running PL/SQL commerce routines dynamically generate HTML screen output that both respond to a specific customer's particular request and conform to effective GUI design practices.
- Supplemental routines using C++ for specific situations, including rendering images.
- PERL scripts for downloading and credit card authorization.

Online stores must never close, so Digital River's system offers multiple redundancies to every aspect of a transaction.

Site Management

While a real-world business must continuously offer new products and services to encourage repeat business, online customers can be equally demanding, expecting selection and prices that reflect real-time inventory and market conditions. Making it easy for a business to adapt product offerings, prices and the interface of the store in response to changing conditions is integral to an effective Web development and maintenance program.

Digital River's proprietary Automated Site Extension System allows the host site to seamlessly extend into the commerce engine. The Commerce Site Construction System allows the client to easily customize individual pages, create specialized commerce channels, use advanced search functions, and specify segments for marketing tests. The highly-automated system allows vendors to select templates and other options to give each site a unique look and feel, coupled with their specific business rules and sales conditions. Again, the seamless nature of the system hides from the consumer the behind-the-scene complexities of the transaction.

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[2] Eighty-four percent of the GVU survey's respondents cited "reliability" as being "very important."

4

Future iterations of Digital River's system will not only make the setup and maintenance of sites easier but enable a full slate of programmable functions as a set of business rules and conditions that can be graphically implemented and adjusted. A new interface will enable faster response to changing market conditions, the creation of an individual customer understanding; and direct interaction with the customer. Prototype sites will be tested in a secure environment and implemented only when the GUI and business functionalities have been precisely crafted.

Analysis and Reporting

Online stores give vendors unmatched power to analyze the behavior of their customers for future marketing initiatives. Running in conjunction with the commerce system, Digital River's proprietary Commerce Data Warehousing System captures critical statistics not just of what items a customer buys, but also how they buy them. What items they saw and dismissed, how often and at what times they shopped, and, of course, what products they actually purchased can all be used to create selling opportunities in the future. The warehoused data is run through the Commerce Information System to develop real-time, multi-dimensional views of the business, allowing vendors to instantly assess the effect of changes in pricing, marketing campaigns and interface, and examine every aspect of both completed and failed transactions.

Digital River understands, however, that unlocking the true value of information involves stepping beyond collecting and processing data, and the company's Intelligent Commerce Agent will result in a more customer-centric position.

Communication, not information inundation, will drive technical development, allowing vendors to better understand how customers transmit their needs for products and services, as well as communicate to customers their product advantages, provide various kinds of literature, and offer 24-hour support to their customers. Finally, as the Internet continues to gain converts abroad, Digital River's solution will give vendors tools to understand how communication extends across language and cultural boundaries.

Integrated Cross-Selling

While vendors on the Digital River system have exclusive access to their customer information, safe from all other vendors, if two or more companies wanted to cross-sell or create product integration, they can agree to unlock each other's databases, developing even more powerful marketing opportunities.

Combining a customer's history with the Digital River network of dealers and vendors allows parallel businesses to offer complementary products

5

and coordinate special offers. Programming interfaces that utilize direct database-sharing connections as well as specialized Internet (TCP/IP socket) connections are being developed to enhance product sharing. Related product sales will be automatically identified and clients offered bundled products and cross-sell promotions, helping ensure that the customer has all the necessary products to properly perform their tasks.

Unlike a traditional shopping mall, where each store operates Independently of each other, Digital River's clients will be able to harness the vast amount of customer information available across the entire network of vendors.

Personalization

That data-gathering will, in part, also allow for a further personalized experience for the consumer.

Versions of Digital River's system currently in development will employ Intelligent agents, collaborative filtering and knowledge bases to create a one-to-one shopping experience. Collaborative filtering will take a customer's shopping history, match it against those of thousands of other customers, and create buying opportunities geared towards that person based on the patterns of others like them. Product offerings and advertising will be highly customized to each individual.

Customers will search for products using agents that understand that person's tastes, needs and situation, akin to a personal shopper that knows the customer's wardrobe and can pick a tie to match the suits in that person's closet at a price with which the customer is comfortable. Purchasing histories will give vendors insight into what products a customer will want next, the likelihood that they will upgrade, and their need for updates, allowing vendors to present products that customers might not know they need. Also, customer service will be augmented with real-time or delayed chat-type capabilities where the customer or agent communicated with Digital River representatives or directly with the software developers and vendors.

Auditing

Vendors are assured of audited and accurate reporting of transactions by a series of steps, matches, and reconciliations performed every day at critical points. For example, the Daily Sales Report as generated from transactions, is matched with the Credit Card Report, which summarizes all charges. Duplicate orders and duplicate charges are voided. Orders for physical goods on backorder, such as manuals, are suppressed until receipt of the backordered inventory. The agreement of the Daily Sales Report with the Credit Card Report as adjusted is verified.

Digital River also ties out credit card receipts with its own records. Each day the Sales Summary is matched to the Credit Card Report. Summary reconciled data is entered into Digital River's accounting system. That accounting information is then matched to the daily credit card deposits on the company's bank statement. Digital River's system ensures accuracy through the cross-footing of records from internal data such as server logs with external records like credit card transactions.

Digital River's books are audited annually by Arthur Andersen LLP. In addition, Digital River clients wishing to have their own audit of sales performed may do so according to the terms of their contract. A typical audit would use sampling techniques to test transactions and trace the flow of information among all the internal Digital River records as well as external sources such as bank statements and credit card processor statements. The auditors would then issue a report summarizing the procedures performed. In the unlikely event that sales are deemed by the auditors to have been inaccurately reported, outside the maximum established by the client contract, the auditors would proceed to quantify the difference. Digital River would then pay that difference to the client.

Summary

Without appropriate attention to the unique technological concerns raised by electronic commerce, an online store risks losing not only the efficiencies promised by digital technologies but the simple functionalities found in traditional stores. Beyond the basic components of a traditional store, such as inventory management, store design, and pricing, online stores need to pay particular attention to security, scalability, auditing procedures, and site management. As the technology develops, collaborative filtering, intelligent agents and extensive buying-pattern databases will bring us closer to the one-to-one marketing ideal where price and product bundling, cross-selling and relationship management are optimized.

At the same time, ease of use and transparency to both the customer and the vendor are equally paramount to a successful online environment. Efficient site management requires intelligently designed templates and options that give each site a unique look and feel without sacrificing ease of use. A robust system allows for scalability to accommodate a diverse product line and demanding consumers.

Digital River, with its network of dealers and developers, experience in business implementation and years of software technology development, has managed thousands of individual Internet commerce sites in a scalable, seamless fashion. As the Internet and electronic commerce evolves and matures, Digital River will develop new technologies to meet those challenges and wring further efficiencies by taking advantage of

7

more granular information about customers and creating more powerful
site development tools.

8